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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/759,970
Filing Date: January 16, 2004
Appellant(s): BUSH, STEVEN D.

David Lockman
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 5/13/2009 appealing from the Office action mailed 11/7/2009.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US 5681391	Mistrater et al.	Oct. 28, 1997
US 6270850	Cai et al.	Aug. 7, 2001

US 6180310	Pinsly	Jan. 20, 2001
US 5149612	Langlois	Sept. 22, 1992

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 21, and 24-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5681391 by Mistrater et al, hereafter Mistrater in view of US Patent 6180310 by Pinsly, hereafter Pinsly and US Patent 6270850 by Cia et al., hereafter Cia.

Mistrater discloses a method for manufacturing a photoreceptor including providing a substrate to be coated with a charge transport layer ("CTL") layer, providing a tube having a upper opening sized to receive the substrate acting as an outlet, the tube having a inlet lower then outlet (see for example figures, Column 18). Mistrater discloses providing a circulating pump to force CTL solution through inlet and fill the tube with circulating CTL solution by way of the pump (Figures, column 12, lines 50-55). Mistrater discloses withdrawing the substrate from the tube at a pull rate and therefore the process as taught by Mistrater necessarily exhibits a differential rate. Mistrater discloses the thickness of the CTL solution deposited is directed related to the relative velocity of the coating material in the space between the drum and the tube wall as well as the viscosity of the coating solution (Column 18). Mistrater discloses a pull rate and vertical velocity and therefore such must result in a differential rate as required by the claim.

Mistrater fails to disclose the particulars of the thickness control. However, Pinsly discloses a method for depositing a CTL layer on drum similar to that as taught by Mistrater, discloses variations in the viscosity of the coating can result in thickness variations during the coating (Abstract, figures, column 2, lines 5-11, column 6). Pinsly discloses during the coating process, solvent is evaporated from the coating solution and thus results in increasing the viscosity. Pinsly discloses during the coating process (including withdrawing) measuring the viscosity of the fluid, where when the viscosity changes a determined threshold (Column 6, examples). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Mistrater to measure the viscosity during the coating process because Pinsly discloses that variations in the viscosity results in coating thickness variation which results in unacceptable results.

Mistrater in view of Pinsly discloses adjusting the viscosity to control the thickness by the addition of solvent, however, the references fail to suggest altering the pump velocity to control the thickness.

However, Cia et al. discloses a method for improving dip coating processes by flowing solution between a substrate and a wall, analogous to that disclosed in the process of Mistrater (abstract). Cia discloses the coating speed, i.e. the relative coating velocity, and the viscosity are related to the coating thickness uniformity (Column 4, lines 30-50).

Therefore, taking the references collectively, it would have been obvious to one of ordinary skill in the art to have modified Mistrater in view of Pinsly altered the relative

coating speed, i.e. adjusting the pumping speed, due to the sensed viscosity because Pinsly discloses viscosity changes throughout the coating process results thickness coating variation and Cia discloses that the coating speed and viscosity are directly related to the coating thickness.

As for the limitation requiring altering the pump motor angular velocity, Mistrater suggests pull rate and initial flow rate of the material results in a relative velocity of the coating material, which affects the coating thickness. Therefore it would have been obvious to one of ordinary skill in the art to have altered the angular pump velocity to alter the vertical flow rate of the fluid in response to the sensed velocity with a reasonable expectation of successfully adjusting the relatively velocity of the coating material. The prior art can be modified or combined to reject claims as prima facie obvious as long as there is a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375.

Therefore, taking the references collectively, one of ordinary skill in the art would have comprehended that to maintain a constant thickness, as the viscosity decreases either add in additional solution (as taught by Pinsly) to provide a constant thickness or adjust the coating speed (by adjusting the pumping speed) to correlate to the new viscosity (as suggested by Cia). Such a determination is well within the skill of one ordinary in the art and would have been obvious to adjusted the initial pumping speed to maintain coating thickness constant throughout the coating process because Cia discloses coating thickness uniformity is directly related to coating speed and viscosity and Pinsly discloses viscosity decreases during the coating process. Since the process

has an initial viscosity and an initial pumping speed, and Pinsly discloses during the coating process, solvent is evaporated from the coating solution and thus results in increasing the viscosity and Cia discloses the coating thickness uniformity is directed related to the viscosity. As the coating process progresses, and the viscosity changes, it would have been obvious to one of ordinary skill in the art to have adjusted the initial pumping speed to compensate for the viscosity change and continue to maintain the constant coating thickness.

Claims 24, 25, 26: Adjusting the pumping speed according to the measured viscosity would have been obvious to one of ordinary skill in the art as discussed above. Additionally, the examiner notes Cia, at column 3, lines 53-56, discloses lower solution viscosity results in a thinner coating, and thus one of ordinary skill in the art would recognize a need to decrease the coating speed and thus it would have been obvious to increase the pumping speed to compensate for the this lowered measured viscosity, i.e. lower pump speed will increase dwell time and thus increase a coating thickness to compensate for the lower viscosity that results in thinner coating. Additionally, it would have been obvious to increase the coating speed in response to a higher measured viscosity because such would result in a uniform coating thickness. Mistrater in view of Pinsly and Cia suggests adjusting the flow rate of the solution through the coating bath due to the sensed viscosity being above a predetermined setpoint, i.e. a threshold amount. It is the examiners position that such control processes are well within the skill of one ordinary in the art.

Claim 27: Pinsly discloses setting viscosity predetermined amounts during the control process to impart the substrate with a uniform thickness and therefore it would have been obvious to one skill in the art at the time of the invention was made to determine the optimal value for the viscosity predetermined amounts used in the process of Mistrater in view of Pinsly and Cia ,through routine experimentation, to impart the substrate with a uniform thickness.

Claim 28: Mistrater in view of Pinsly and Cia discloses adjusting pumping speed as discussed above, however, fails to explicitly discloses upper and lower pumping speeds. However, the pumping speed adjustment is a result effective variable, as taught by Mistrater in view of Pinsly and Cia, i.e. effects the coating uniformity, and therefore it would have been obvious to one of ordinary skill in the art to have determined the optimum pumping speed adjustment in the process of Mistrater in view of Pinsly and Cia, through routine experimentation, to impart the substrate with a uniform thickness.

Additionally, it is the examiners position that the claimed invention is merely a predictable use of prior art elements (control systems, vertical flow rate and viscosity) as discloses by Mistrater in view of Pinsly and Cia to produce the established function of the prior art elements (a uniform thickness). *See KSR Int'l Inc. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007).

Claim 29: Mistrater discloses the substrate is a drum (figures, examples).

Additionally, it is the examiners position that the claimed invention is merely a predictable use of prior art elements (control systems, vertical flow rate and viscosity) as

discloses by Mistrater in view of Pinsly and Cia to produce the established function of the prior art elements (a uniform thickness). *See KSR Int'l Inc. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007).

Claims 22-23, and 31-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mistrater in view of Pinsly and Cia as applied in paragraph 8 above, and further in view of US Patent 5149612 by Langlois et al., hereafter Langlois.

Claims 22-23, 31: Mistrater in view of Pinsly and Cia is applied here for the same reasons as set forth in paragraph 4 above, additionally, Mistrater discloses metering fluid using a motor driven pump of various configurations, but fails to disclose utilizing a variable speed controller. However, Langlois, teaching of metering a controlled vole rate of fluid discloses using a variable speed controller (column 9, lines 1-24). Therefore, Langlois discloses variable speed controllers are known and suitable in the prior art and therefore taking the references collectively, it would have been obvious to one of ordinary skill in the art at the time of the invention to include a variable speed controller in the process of Mistrater in view of Pinsly and Cia with a reasonable expectation of providing predictable control over the fluid flow rate.

Additionally, all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention. See *KSR Int'l Inc. v. Teleflex Inc.*, 127 S Ct. 1727, 1741, 82 USPQ2d.

Claims 32, 33, and 34: Adjusting the pumping speed according to the measured viscosity would have been obvious to one of ordinary skill in the art as discussed above. Additionally, the examiner notes Cia, at column 3, lines 53-56, discloses lower solution viscosity results in a thinner coating, and thus one of ordinary skill in the art would recognize a need to decrease the coating speed and thus it would have been obvious to increase the pumping speed to compensate for the this lowered measured viscosity, i.e. lower pump speed will increase dwell time and thus increase a coating thickness to compensate for the lower viscosity that results in thinner coating. Additionally, it would have been obvious to increase the coating speed in response to a higher measured viscosity because such would result in a uniform coating thickness. Mistrater in view of Pinsly and Cia suggests adjusting the flow rate of the solution through the coating bath due to the sensed viscosity being above a predetermined setpoint, i.e. a threshold amount. It is the examiners position that such control processes are well within the skill of one ordinary in the art.

Claim 35: Pinsly discloses setting viscosity predetermined amounts during the control process to impart the substrate with a uniform thickness and therefore it would have been obvious to one skill in the art at the time of the invention was made to determine the optimal value for the viscosity predetermined amounts used in the process of Mistrater in view of Pinsly and Cia ,through routine experimentation, to impart the substrate with a uniform thickness.

Claim 36: Mistrater in view of Pinsly and Cia discloses adjusting pumping speed as discussed above, however, fails to explicitly discloses upper and lower pumping

speeds. However, the pumping speed adjustment is a result effective variable, as taught by Mistrater in view of Pinsly and Cia, i.e. effects the coating uniformity, and therefore it would have been obvious to one of ordinary skill in the art to have determined the optimum pumping speed adjustment in the process of Mistrater in view of Pinsly and Cia, through routine experimentation, to impart the substrate with a uniform thickness.

Additionally, it is the examiners position that the claimed invention is merely a predictable use of prior art elements (control systems, vertical flow rate and viscosity) as discloses by Mistrater in view of Pinsly and Cia to produce the established function of the prior art elements (a uniform thickness). *See KSR Int'l Inc. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007).

(10) Response to Argument

In response to Appellant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

The Appellant has argued against the Pinsly reference, stating that the reference does not teach variations in coating thickness are directly related to variations in viscosity and, therefore the finding of fact is wrong. The examiner disagrees and notes Pinsly explicitly discloses "variations in charge transport layer coating solution viscosity

while coating . . . cause variations in coating material thickness. The thickness variations can be on any given drum or on different drums." (column 2, lines 5-10). The Appellants content that this statement of fact actually teaches "variations in CTL viscosity *along with* sudden and small change in CTL flow rate *and* other mechanisms affect coating material thickness" (emphasis in original), see Appeal Brief, page 12. This position is clearly not support by any factual evidence. There is no support for such a narrow interpretation of the teaching. The Appellant appears to be inserting "with" into the list of mechanisms, where the original text does not require the two to be conjunctive to cause coating thickness variations. The examiner is of the position that the listing is a teaching of coating mechanisms that "cause variations in coating material thickness", listing exemplary mechanisms as coating viscosity changes and flow rate. The mere disclosure of "among other mechanisms" supports the examiners position, where a listing of two possible mechanisms that will effect the coating thickness. Additionally, Pinsly discloses streaking

The Appellant appears to concede that the Pinsly reference discloses variations in viscosity will result in thickness variations, see Remarks pages 11-12, where the Appellant argues Pinsly is directed at controlling streaking during deposition and then states "streaks are a form of thickness variation". Pinsly explicitly discloses eliminating streaks, i.e. eliminating thickness variations as conceded by Appellant, and therefore the examiner maintains that Pinsly discloses uniform coating thickness. Pinsly explicitly discloses that it is "another object of the present invention to provide an improved coating process which provides improved charge transfer layer coating thickness

uniformity" (Column 3, lines 13-15). Pinsly discloses during the coating process, solvent is evaporated from the coating solution and thus results in increasing the viscosity. Pinsly discloses during the coating process (including withdrawing) measuring the viscosity of the fluid, where when the viscosity changes a determined threshold (Column 6, examples).

The Appellant argues that "Pinsly unequivocally teaches that coating solution flow rate changes cause coating material thickness variations, that these variations are undesirable, and that the flow rate of the coating solution should be substantially constant." (see Appeal Brief page 12). Again the examiner notes that Pinsly discloses variations in the viscosity of the coating can result in thickness variations during the coating (Abstract, figures, column 2, lines 5-11, column 6). Pinsly discloses during the coating process, solvent is evaporated from the coating solution and thus results in increasing the viscosity and therefore creates streaks, as admitted by Appellant a form of thickness variation. Pinsly discloses during the coating process (including withdrawing) measuring the viscosity of the fluid, where when the viscosity changes a determined threshold (Column 6, examples).

The Appellant argues that Pinsly "does not teach that viscosity can be controlled to control a coating thickness uniformly and it teaches away from any useful purpose for varying the flow rate of the coating solution." (see Appeal brief page 12). The examiner disagrees. Pinsly discloses variations in coating viscosity results in variations in the coating thickness on the same drum (i.e. a non uniform coating) and discloses

controlling the viscosity of the coating composition to achieve high quality layers and uniform coatings.

Pinsly explicitly discloses "when relatively large quantities of replenishment solvent are periodically added . . . to return the coating composition back to optimum predetermined viscosity, the thickness of the deposited dip coating varies with the variation in the viscosity so that a chart (thickness in micrometers vs. time) [sic] of the coating thickness . . . may resemble a sine wave." (Column 7, lines 35-43). Additionally, Pinsly discloses adding small amounts of replenishing solvent uniformly and that the "addition of replenishment solvent to the recirculating charge transport layer coating composition minimizes large flucuations in viscosity and the variation of thickness of the deposited coating resembles a substantially straight horizontal line when thickness (vertical axis) is plotted against time (horizontal axis). Thus, large change in viscosity of the recirculating coating composition and the resulting undesirable fluctuations in coating thickness are avoided."

In response to Appellant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The Appellant argues against the combination of Mistrater, Cia, and Pinsly arguing that none of the references disclose or suggest altering the vertical flow rate of the coating based on the measure viscosity. However, the examiner disagrees, and initially notes that the rejection is based on the teachings of the references taken

collectively. Specifically, Pinsly discloses during the coating process, solvent is evaporated from the coating solution and thus results in increasing the viscosity. While Pinsly discloses maintaining the constant coating speed but adjusts the viscosity to maintain the coating thickness constant, Cia discloses that coating thickness is directly related to coating speed and viscosity. Therefore, taking the references collectively, one of ordinary skill in the art would have comprehended that to maintain a constant thickness, as the viscosity decreases either add in additional solution (as taught by Pinsly) to provide a constant thickness or adjust the coating speed (by adjusting the pumping speed) to correlate to the new viscosity (as suggested by Cia). Such a determination is well within the skill of one ordinary in the art and would have been obvious to adjusted the initial pumping speed to maintain coating thickness constant throughout the coating process because Cia discloses coating thickness uniformity is directly related to coating speed and viscosity and Pinsly discloses viscosity decreases during the coating process.

Therefore, since the process has an initial viscosity and an initial pumping speed (or angular velocity), and Pinsly discloses during the coating process, solvent is evaporated from the coating solution and thus results in a change of viscosity and Cia discloses the coating thickness uniformity is directed related to the viscosity and coating speed (i.e. pumping speed and angular velocity). As the coating process progresses, and the viscosity changes, it would have been obvious to one of ordinary skill in the art to have adjusted the initial pumping speed to compensate for the viscosity change and continue to maintain the constant coating thickness.

The Appellant argues that Pinsly teaches away from altering the vertical flow rate, however, the examiner can not locate any support for such a proposition. The Appellants cite a portion of the reference which discloses that the flow rate should be substantially constant; however, such a teaching of is not a teaching away from altering the coating speed. Pinsly is cited as a teaching that it is known in the art that variations in coating thickness are directly linked to the variations in the viscosity of the coating solution. Cia discloses that the coating thickness is directly related to both viscosity of the coating solution as well as the coating speed. Therefore, taking the references collectively, one would reasonably expect to predictably provide a uniform coating by measuring the viscosity of the solution and either adjust the viscosity to maintain the viscosity in a desired range (as taught by Pinsly) or adjust the pumping speed accordingly because Cia discloses both variables are result effective variable (effect the coating thickness uniformity) and modification of one (pumping speed) in response to a variation in another (viscosity) to achieve the desired results is well within the skill of one ordinary in the art. Additionally, adjusting the pumping speed in response to the viscosity to maintain a constant thickness would have lead to predictable results because a predictable use of prior art elements according to their established functions to achieve a predictable result is prima facie obvious. See *KSR Int'l Inc. v. Teleflex Inc.*, 127 S Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007).

The Appellant has argued against the Cai reference and Pinsly reference arguing that nothing in any of the references disclose monitoring on variable of a coating process and adjusting another to compensate for the change in the monitored variable.

While the reference do not explicitly disclose such, the teaching is implicit in the combination of references. Cai discloses the coating thickness is a function of both the viscosity and the coating speed, see equation column 4. If the coating viscosity changes during the coating process, as taught by Pinsly, the coating thickness (h) may be maintained constant by either (1) adjusting the viscosity or (2) adjusting the coating speed. More specifically, one of ordinary skill in the art would understand that the coating thickness can be maintained constant when the coating viscosity times the coating speed (μU) remains constant. Therefore, if the coating viscosity changes as taught by Pinsly, μU can be maintained constant if the μ is altered OR U is altered. While the Appellant argues that the examiners leap is obtained from the Appellants specification, the examiner disagrees. Cia explicitly discloses that the coating thickness is directly related to the product of viscosity and the coating speed. One of ordinary skill in the art would understand that if the viscosity changes during the coating thickness the product of the viscosity and the coating speed can be maintained constant by (1) adjusting the viscosity and/or (2) adjusting the coating speed and therefore adjusting the coating speed in response to the change in viscosity (as taught by Pinsly) would have been obvious to one of ordinary skill in the art to provide predictable results of obtaining a uniform coating thickness.

One would reasonably expect to predictably provide a uniform coating by measuring the viscosity of the solution and either adjust the viscosity to maintain the viscosity in a desired range (as taught by Pinsly) or adjust the pumping speed accordingly because Cia discloses both variables are result effective variable (effect the

coating thickness uniformity) and modification of one (pumping speed) in response to a variation in another (viscosity) to achieve the desired results is well within the skill of one ordinary in the art. Additionally, adjusting the pumping speed in response to the viscosity to maintain a constant thickness would have lead to predictable results because a predictable use of prior art elements according to their established functions to achieve a predictable result is prima facie obvious. See *KSR Int'l Inc. v. Teleflex Inc.*, 127 S Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

David P Turocy

/David Turocy/

Examiner, Art Unit 1792

Conferees:

/Timothy H Meeks/

Supervisory Patent Examiner, Art Unit 1792

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